

Managing Polypharmacy in the 15-Minute Office Visit



Demetra Antimisiaris, PharmD, BCGP, FASCP^{a,b,c,*}, Timothy Cutler, PharmD, BCGP^d

KEYWORDS

- Polypharmacy • Medication reconciliation • Potentially inappropriate medications
- Beers criteria • Morisky scale • Geriatric syndromes
- Comprehensive medication management • Drug interactions

KEY POINTS

- The prevalence of polypharmacy is significant and growing, with the United States leading the world in medication per capita use. Older adults live with polypharmacy due to high chronic and acute disease burden.
- Polypharmacy (medication management) skills are essential when caring for older adults and can offer improved quality measure outcomes and improved reimbursements.
- The health care system and multiple providers contribute to the syndrome of polypharmacy. At minimum, a thorough medication reconciliation and medication management session should be performed at least annually.
- Proactive implementation of a systematic polypharmacy management program (despite the 15-minute office visit rush) is preferable to reactive management of sometimes serious medication-related problems.
- Efficient involvement of the patient, the office team, and community resources can result in improved medication management and outcomes.

INTRODUCTION

The American Board of Internal Medicine Foundation launched an initiative called Choosing Wisely, with the goal of advancing dialogue on wasteful or unnecessary medical tests, treatments, and procedures (American Medical Board Foundation. Choosing Wisely. Available at <http://www.choosingwisely.org>). The Choosing

The authors have nothing to disclose.

^a Pharmacy and Medication Management Program, Department of Pharmacology and Toxicology, University of Louisville, 501 East Broadway, Suite 240, Louisville, KY 40202, USA;

^b Department of Neurology, University of Louisville, 501 East Broadway, Suite 240, Louisville, KY 40202, USA; ^c Department of Family Medicine and Geriatrics, University of Louisville, 501 East Broadway, Suite 240, Louisville, KY 40202, USA; ^d Department of Clinical Pharmacy, UCSF School of Pharmacy, 533 Parnassus Avenue U585, UCSF POBox 0622, San Francisco, CA 94117, USA

* Corresponding author. Department of Family Medicine and Geriatrics, University of Louisville, 501 East Broadway, Suite 240, Louisville, KY 40202.

E-mail address: demetra.antimisiaris@louisville.edu

Prim Care Clin Office Pract 44 (2017) 413–428

<http://dx.doi.org/10.1016/j.pop.2017.04.003>

0095-4543/17/© 2017 Elsevier Inc. All rights reserved.

primarycare.theclinics.com

Wisely campaign asked national organizations representing medical specialists to identify areas of potential waste and the American Geriatrics Society in 2013 released their Choosing Wisely list of 10 things clinicians and patients should question; 7 of the 10 Choosing Wisely recommendations pertain to medication use.¹

The need for the care of older adults has increased over the past several years, especially as it relates to the use of medications in older adults. From the years 1998 to 2008, the overall rate of office visits for those over age 65 increased by 13%. For those visits where medications were prescribed or continued, patients over age 65 had the highest increase in visits (31%) compared with any other age group.² In the new era of quality measure reporting and incentives, management of medications in the elderly has become an important element of primary care. For example, the Physician Quality Reporting System and the Medicare Access and CHIP Reauthorization Act implemented by the Centers for Medicare and Medicaid Services list several measures that evaluate appropriate medication management as an integral part of outcomes ranging from management of neuropsychiatric symptoms of dementia, plan of care for falls, urinary incontinence plan of care, diabetes control, statin therapy for prevention of cardiovascular disease, and medication reconciliation postdischarge. Failure to achieve quality thresholds results in lower Medicare payments to individual and group practices.

Any symptom in an elderly patient should be considered a medication related problem until proved otherwise

—Gurwitz J, Monane M, Monane S, and Avorn J. *Brown University Long-Term Care Quality Letter, 2001.*³

The challenges of appropriate management of medications in older adults can be broken down into the following areas: multimorbidity, polypharmacy PIMs in the elderly, underuse of medications, and adherence and access to medications. There are several challenges specific to primary care providers (PCPs) when managing these issues in older adults, which include the brevity of the typical office visit; medically complex patients; multiple specialists who contribute to a patient's overall polypharmacy; frequent hospitalizations and transitions of care; lack of high-quality evidence to guide prescribing for older adults, in particular the old-old, who are typically over 80 years of age; and the fact that evidence-based guidelines rely on clinical trials that typically exclude multimorbid and frail older adults.^{4–7}

Polypharmacy is traditionally defined in the literature as the use of 5 or more chronic medications, the use of inappropriate medications, or medications that are not clinically warranted.⁸ Historically, the 15-minute office visit consists of approximately 7 minutes dedicated to establishment of the problem, 3.5 minutes to work on the problem, and 3.5 minutes dedicated to medications.⁴ Patients living with polypharmacy do not have much opportunity to have their overall medication needs addressed in a clinic visit. In the era of quality measure reimbursement, these challenges also present an opportunity to demonstrate improvement of outcomes and leveraging quality-based reimbursements through proactive attention to management of polypharmacy.

There is increasing evidence of the value, decreased morbidity, and mortality as well as return on investment when focused medication management occurs.^{9–15} The intent of this article is to provide some strategies PCPs to provide overall polypharmacy management for the increasing cohort of older adult patients expected in the coming years.

ACHIEVING OPTIMAL POLYPHARMACY MANAGEMENT IN THE OLDER ADULT

Focus on Monitoring Medication Use

Older adults live with multiple chronic conditions, underlying incidents of acute medical and functional problems, which leads to multiple transitions of care. Multimorbidity and transitions of care leads to polypharmacy, which is considered a geriatric syndrome. Geriatric syndromes are problems that are highly prevalent in older adults, especially frail older adults. Geriatric syndromes do not refer to an organic disease but multifactorial issues involved with multiple problems, leading to added impairment and negative impact on quality of life. Examples of geriatric syndromes include but are not limited to dizziness, cognitive impairment, delirium, falls, frailty, syncope, urinary incontinence, and polypharmacy. A core principle of the management of polypharmacy in older adults is avoidance of PIMS. Ultimately, determination of whether a medication is inappropriate or not is highly individualized and often circumstantial as well. A medication that is inappropriate now, for example highly elevated carbidopa-levodopa doses in a patient long term on high doses, may become appropriate again after a carbidopa-levodopa high-dose holiday. Medications that are considered potentially inappropriate in general can be found in 2 established resources that serve as guidance on PIMS in older adults. These 2 resources are the Beers criteria and the START and STOPP criteria.^{16,17} The use of the Beers criteria and START and STOPP criteria is discussed later.

Polypharmacy and the health care system: the care of older adults is typically provided by multiple specialists, in addition to PCPs, as well as several ancillary care providers. A silo effect can occur, where each care provider works on a specific problem without ever having an opportunity to communicate or discuss with the other providers. Adding to the silo effect are the various care settings that older adults frequent, such as hospitals, assisted living residences, nursing homes, postdischarge rehabilitation facilities, adult day care, and more. The complexity and velocity of care changes multimorbid older adults live with lead to a dearth of opportunities to perform needed comprehensive medication reconciliation (CMR), leading to unchecked polypharmacy and undesirable outcomes.¹⁸ Each transition of care should warrant a CMR, and even when a CMR is just performed at least annually, up to 90% of patients have some form of medication-related problem identified.¹⁹ CMR and comprehensive medication management (CMM) are challenging to fit into a busy primary care (or specialty) office practice. Medicare offers an annual CMM for beneficiaries through Medicare D. Medication therapy management service is provided through a Medicare patient's pharmacy benefits manager and patients can be referred for a CMM by helping them to contact their pharmacy benefits manager and be assigned a consultant. There are innovative models, particularly associated with patient-centered medical home models, which provide the operationalization methods (billing models) to provide improved CMR and CMM in the office practice.^{20,21}

One immediate means of implementing improved medication management is to focus on monitoring and pharmacovigilance. There is evidence that medication monitoring is an often-missed opportunity to prevent adverse drug events (ADEs).²² The major factors leading to ADEs in ambulatory community-dwelling older adults have been identified as rooted in problems with monitoring, prescribing, and adherence. Monitoring is involved in approximately 60% of ADEs, prescribing involved in 58%, and adherence involved in 60% (more than 1 of these factors could contribute to each incident).²²

Two major studies of older adults evaluating emergency department visits and hospitalizations for ADEs found that drugs, such as digoxin, warfarin, insulins, oral

antiplatelet agents, and oral hypoglycemic agents, were responsible for a majority of hospitalizations (39% and 67%, respectively) and PIMs included on the Beers list were responsible for only 1.2% of hospitalizations. Digoxin, warfarin, insulins, oral antiplatelets, and oral hypoglycemic medications were 35 times more likely to result in hospitalization than medications considered potentially inappropriate for older adults.^{23,24} Although the Beers list of PIMs in the elderly is important, the medications consistently found to result in older adults' hospital visits are medications that are commonly in use, the monitoring parameters of which are well known. These studies support the idea that potentially missed monitoring of routine, daily use medications, for chronic disease can result in serious medication misadventure in the elderly. Additional evidence supporting the need for appropriate medication monitoring includes a systematic review, which evaluates preventable ADEs in ambulatory care patients, and found that 45% of preventable adverse drug reactions were due to inadequate monitoring and 16% due to ignoring or missing a clinical or laboratory result.²⁵

Because the effort required to have an impact on patient adherence is labor intensive and challenging, PCPs working toward more effective medication monitoring may be more easily achieved than working on adherence²⁶ (CMM consults through Medicare D can provide a means of working on adherence as well as peer disease support groups and midlevel providers). Monitoring medication use in the office practice is achievable when a systematic approach is implemented, such as that used to monitor international normalization ratio for persons receiving warfarin.

Appropriate monitoring of medication use requires setting up a system to provide periodic interval monitoring for each medication a patient is using. Such a system might include assigning tracking of monitoring to medical staff, because sometimes complex medication use tracks 20 or more medications for 1 patient. Similar systems are often used for international normalization ratio tracking in patients using warfarin. Alternately, electronic records could be designed to track missed monitoring. Besides tracking intervals of monitoring for each medication, a clinic team could perform other tasks, such as database scanning for recommended monitoring appropriate for each drug and drug interaction evaluation. Clerkship students, midlevel providers, or other members of the primary care team can perform this routine work as well.

People often think of drug monitoring as making sure the laboratory monitoring associated with a drug is completed. But other important forms of monitoring include following drug monograph recommendations to track and document common adverse events for each medication, common medication–disease adverse events, drug–drug interactions, and monitoring renal, hepatic, and cytochrome enzyme clearance interactions.

Lastly, a commonly overlooked form of monitoring is monitoring for efficacy. If efficacy is nonexistent, then a medication should be discontinued from use (Box 1).

Algorithms and processes for monitoring appropriateness and need of medication use in older adults have been created and can be useful in developing a systematic approach to medication use monitoring^{27,28} (see algorithm by Garfinkle and colleagues, referenced in *UptoDate*).²⁹

Heightened efforts to monitor drug use would work toward decreasing the incidence of overlooked pharmacovigilance, thus preventing emergency department visits and hospitalizations.^{30,31}

Deprescribing and Prescribing of Omitted Therapies

Deprescribing has been demonstrated as a useful tool in optimization of functional status and diminishing medication-related problem risks, where the number of medications taken by a patient is the single most important predictor of inappropriate

Box 1**Medication monitoring check list**

- Efficacy—if not efficacious, consider deprescribing.
- Laboratory monitoring—track, follow-up, and implement at appropriate intervals.
- Drug-drug interactions—run a drug interaction checker periodically and document presence or absence of drug interactions.
- Drug-disease interactions
- Monitor renal, hepatic clearance.
- Keep aware of cytochrome enzyme clearance interactions—for example, a course of fluconazole can cause phenytoin to become toxic.

medication use.³² Deprescribing is the process of stopping or tapering medications to minimize inappropriate medication use or polypharmacy. The goal is to target one at a time and to avoid changing too many items at once or abruptly.

Consideration of deprescribing of a medication: look for medications that have no valid reason for being used; evaluate the overall risk of drug-induced harm; assess current or future benefit versus risk; prioritize discontinuation and consider removal of medications with lowest benefit to heightened harm risk first; and implement a plan to discontinue (perhaps a taper) and monitor follow-up. Typically, the medications that have no accompanying diagnosis, problems, or obvious reason for use are there because they are treating underappreciated side effects of other medications. It is best to strive to manage the side effects of offending agents first by optimizing dose or selection of another medication for the problem rather than making the drug tolerable by treating the side effect.

Scan for PIMs for elderly patients by consulting criteria regarding PIM and appropriate medication use in older adults, such as the Beers criteria and START and STOPP criteria. These criteria also present evidence and expert opinion regarding underprescribed medications that should be used in the elderly (ie, warfarin in atrial fibrillation patients who fall; although is counterintuitive, the supporting evidence is presented).^{16,17}

Avoid the Prescribing Cascade

Systematic medication monitoring should accompany vigilance in avoiding the prescribing cascade. The prescribing cascade occurs when a medication is used to treat the side effect of another medication (Fig. 1). For most cases, the prescribing cascade dynamic is undesirable but sometimes it is intentional. Examples of prescribing a medication to treat the side effects of another medication are (1) a patient taking antipsychotic agents resulting in extrapyramidal symptoms, and anticholinergic agents are prescribed to treat the extrapyramidal symptoms when the benefit of antipsychotic agent use outweighs the risks, and (2) the use of a stimulant laxative for patients receiving chronic opioids.

Individualization of Medication Use

An important consideration in the care of older adults is the need for individualization of care due to the heterogeneous health status of persons aged 65 and older. Most single-disease practice guidelines do not include evidence derived from multimorbid-ity patients or persons with advanced age.³³ With age, patients become



Fig. 1. Prescribing CASCADE-In this example, hydrochlorothiazide used for hypertension, eventually leads to gout, which is treated with indomethacin, which becomes the cause of dangerously high blood pressure, nose bleeds, and confusion (not recommended for older adults per Beers criteria, yet a drug of choice for gout treatment). The prescribing CASCADE described here is a real case, resolved permanently by substitution of hydrochlorothiazide with low dose amlodipine.

physiologically and functionally very different from one another due to chronic disease and individual morbidity burdens, which leads to individualized life expectancies and physiologic reserve. The physiologic changes that occur with age, such as diminished renal function and increased percent body fat with decreased percent body water, have an impact on the way medications perform pharmacokinetically, and altered pharmacodynamic response is influenced by these pharmacokinetic changes as well as underlying physiologic pathologies, such as impaired baroreceptor response. Age is only a surrogate marker for many of the factors to consider in choosing treatment options. There are people in their early 60s with serious debility and others near 90 who are busy climbing mountains. The Food and Drug Administration (FDA) recently mandated increased inclusion of more subjects over 65 years of age in clinical trials, yet most trials do not reflect the actual proportion of older adults living with the disease for which the medication is being tested.³⁴ The effects of comorbidities on disease-specific outcomes are inadequately studied in chronic disease trials from which clinical guidelines are derived.^{35,36}

The cornerstone of treatment recommendations are chronic disease guidelines and other disease-specific guidelines resulting in the use multiple medications, especially in those with multiple conditions. The ability to sustain high drug burden and other interventions is relative to factors, such as frailty, physiologic reserve, and total disease burden.^{37–39} Conversely, there is the question of the impact of medications on functional status.⁴⁰ Polypharmacy resulting from multiple providers following disease practice guidelines, resulting in untested combinations of medications, can be associated with suboptimal functional status and negative outcomes.^{41–44} That said, robust older adults who are living with minimal chronic disease burden and minimal functional impairment can benefit from long-term disease prevention just as a younger person can.

Application of clinical practice guidelines to the older adult patient requires special assessment and consideration: Are patients robust or frail? What is their functional status? Is the current functional status temporary or long term? How heavy is their comorbidity and geriatric syndrome burden? What are their preferences and goals of care? How does a patient's quality of life interplay with these considerations? Is the patient able to adhere to treatment? What are the risks versus benefits of treatment? What is the time horizon to benefit versus patient's life expectancy?

Consider the recent changes in the United States guidelines for diabetes, lipids, and hypertension. All of them have added a statement of individualization of care for those over 80 years of age, and the statin use guidelines have explicitly included consideration of 10-year cardiovascular risk in determining medication use choices.^{45–47} These major chronic disease guidelines have acknowledged that application of the evidence, such as time to benefit, time to harm, and other parameters, are applied differently to individuals outside the (younger and less medically complex) study population, such as some older adults.

The American Geriatrics Society Expert Panel on the Care of Older Adults with Multimorbidity⁴⁸ recommends a stepwise approach. The approach explains an algorithm that includes patient's primary concern, consideration of relevant evidence, prognosis, interactions with and among treatments and conditions, benefits versus harms, communication, and reassessment for alignment with preferences, feasibility, adherence, and benefit at selected intervals. For some patients, careful consideration of multimorbidity effects on treatments can have a marked impact on medication management decisions. In addition to the American Geriatrics Society approach, a classic algorithm to help determine appropriateness of medication use is the Medication Appropriateness Index, illustrated in **Box 2**.

Lastly, after ensuring a patient's understanding of conditions, medications, and risks versus benefits, the importance of finding out if the patient wants to take the medications being prescribed or recommended to take should not be overlooked. For a comprehensive online review of person-centered medication use optimization, refer to the British National Institute for Health and Care Excellence guideline.⁴⁹

As for medication dosing, the rule of thumb in terms of titrating medication dose is "start low and go slow." Although medications typically are accompanied by target dosing, for the frail elderly, targeting the minimum effective dose is a safer approach.

Verification of appropriate renal dose adjustment should be checked for each medication an older adult patient is taking. The renal dose adjustment should be made using the Cockcroft-Gault equation for estimated creatinine clearance for 2 reasons: first, the Cockcroft-Gault method is the FDA standard by which dose recommendations in the drug monographs are reported (thus to use another equation would be like comparing apples to oranges), and second, the Cockcroft-Gault equation underestimates renal clearance compared with the estimated glomerular filtration rate, Modification of Diet in Renal Disease, or gold standard of 24-hour urine collection. Underestimation of renal function is typically safer for older adults regarding renal dose adjustment for medications. The Cockcroft-Gault equation is easily found in point-of-care applications, such as Epocrates, Lexicomp, and online support sites, such as GlobalRPh or National Kidney Foundation. Typically, height, weight, and

Box 2

Medication appropriateness index

1. Is there an indication for the drug?
2. Is the medication effective for the condition?
3. Is the dosage correct?
4. Are the directions correct?
5. Are the directions practical?
6. Are there clinically significant drug-drug interactions?
7. Are there clinically significant drug-disease/condition interactions?
8. Is there unnecessary duplication with other drugs?
9. Is the duration of therapy acceptable?
10. Is this drug the least expensive alternative compared with others of equal usefulness?

From Hanlon JT, Schmadre KE, Samsa GP, et al. A method for assessing drug therapy appropriateness. *J Clin Epidemiol* 1992;45(10):1045–51; with permission.

serum creatinine level are needed at hand to use these calculators. If there is not a serum creatinine level, for persons over 65 year of age, a minimum creatinine clearance can be estimated using serum creatinine = 1 mg/dL. In persons over 65, even if the serum creatinine is less than 1 mg/dL, clinical medication consultants typically round up to 1 mg/dL because most persons over 65 have some degree of sarcopenia, which can cause misleading creatinine levels for estimating renal clearance. Also, it is important to use stable serum creatinine levels. Much like blood pressure, one reading may reflect a transient condition due to medication use, dehydration, or some other renal accident.⁵⁰

IMPLEMENTATION OF POLYPHARMACY MANAGEMENT IN THE 15-MINUTE OFFICE VISIT

It is important to recognize that optimal polypharmacy management does not occur in 15 minutes. Proactively and systematically, however, checking off some of the elements of optimal polypharmacy management during each visit and repeating periodically (annually perhaps) is preferable to addressing polypharmacy when problems arise (Fig. 2).

Medication Reconciliation

Medication reconciliation is typically defined as getting the most accurate list of medications a patient is using. Appropriate medication reconciliation involves patient and caregiver interviews, lists from health records, pharmacy records, hospitalization

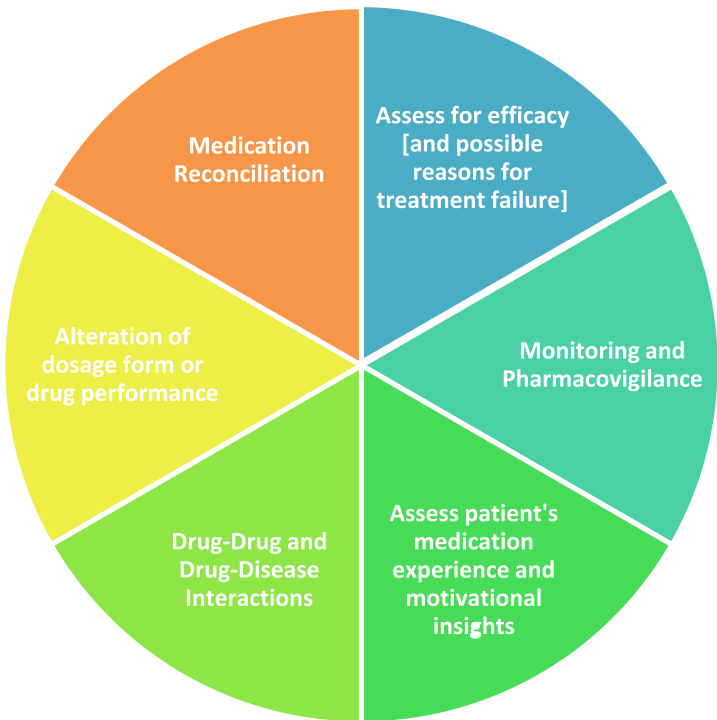


Fig. 2. Proposed checklist of polypharmacy management checklist items.

records, controlled substance refill reporting, and accounting for over-the-counter medication, supplements, herbal products, and vitamins. The process of getting accurate data is impacted by transitions of care, a patient's ability to report and keep records, clinical team time, and resources. Much of the work of medication reconciliation can be given to midlevel providers, office staff, student volunteers working in a clinic, and health care professional trainees. The data-gathering aspect can be done as much as possible before the 15-minute office visit with system implementation of medication reconciliation protocol.

The brown bag assessment means that patients bring everything they are taking at the current time in a bag to each appointment. The brown bag assessment is the gold standard for medication reconciliation (if patients remember to bring everything they are taking). The ideal is to go through the brown bag assessment at each office visit, although once per year at minimum is helpful. Sometimes patients omit some products they are taking because they do not assume, for example, that an over-the-counter medication should be part of a brown bag assessment; perhaps they perceive the brown bag should be only prescription medications. Therefore, it is important to provide a bit of training for patients to ensure that they understand they are to bring everything. Patients should also bring a list of medications they take, if they keep one, for comparison.

Medication reconciliation and initial medication use interviewing can be done by office staff, medical assistants, volunteer students, or trainees before a 15-minute office visit by going through the process of listing the contents of the bag. It is important to train whoever does the brown bag assessment to ask open-ended questions to find out if there is anything missing. Open-ended questions about how a patient is taking each medication should be recorded and compared with the instructions on the labels.

Staff or volunteers can also work to gather medication data for patients ahead of an office visit by requesting hospital discharge records, pharmacy records, and controlled substance reporting records to save time and to help ensure complete medication reconciliation during the office visit. Health Insurance Portability and Accountability Act training and credentialing for patient interaction and care are requirements before enlisting staff or volunteers to help with brown bag assessments and medication reconciliation data collection. Regarding the added time required to provide for older adult patients in the clinic setting in general, precepting students can be a bidirectionally beneficial activity. Students learn much about the complexity of patient care and gain experience, and they can be helpful to a practice setting.

Monitoring and Pharmacovigilance

- For each prescription and over-the-counter medication, consult point-of-care drug databases or the FDA drug monograph prescribing information to document, for each medication, routine laboratory studies, renal dose adjustments, top side effects, and drug-disease interactions.
- For herbal products and supplements, consult the NIH Complementary and Alternative Medicine Herbal and Natural Products Web site, where there is a list of databases that can offer resources for monitoring these products (see section on herbal products and supplements). Typically, drug interaction checkers, when including herbal, supplements, and vitamins, flag problems of product-disease or product-drug interactions accurately.

When a patient is using drugs that are new to market, a heightened approach to monitoring should be adapted. As discussed previously, clinical studies tend to exclude older

adult patients, in particular frail and multimorbid patients. The exclusion of the very old and frail from safety and efficacy trials that bring drugs to market, means, expected monitoring and adverse effect recommendations for frail older adults is uncertain in new to market drugs. The case of Vioxx[®] (Rofecoxib) is an example of a new-to-market drug that possessed a high risk of ADEs, which was discovered through post-marketing surveillance, and a serious threat to older adults. Older adults are more susceptible to unexpected adverse outcomes with new-to-market drugs due to lack of physiologic reserve and lack of data that from postmarketing surveillance.⁵¹

Clinical Pearl

New-to-market medications should be avoided in older adults; older adults tend to be excluded from new drug trials, and postmarketing data typically reveal problems with medications in older adults.

Drug-Drug Interactions

At minimum, running a patient's prescription and over-the-counter medications, herbal products, and supplements through an interaction checker should be done periodically.⁵² There are several available in point-of-care applications, such as Epocrates or Lexicomp, or online. Patients can be advised to help perform their own polypharmacy pharmacovigilance by running their lists through interaction checkers online, such as those found at Drugs.com or RxList. The results can then be reviewed with patients to improve self-management and medication use literacy. The patient or clinic staff could have the process of running a drug interaction checker done before the appointment with the provider. The frequency for performing interaction checkers is dependent on patients and the consistency of their total medication and product use.

Assess for Medication and Over-the-Counter Herbal or Supplement Product Efficacy

One important and commonly overlooked aspect of polypharmacy management is assessment of medication efficacy. Some medications are difficult to assess for efficacy because their effectiveness is targeted at long-term prevention, and a person's life expectancy is a variable which, therefore impacts the definition of efficacy. But, in frail older adults, when medications are used to treat a problem that affects quality of life or end-stage disease, assessment of efficacy is not as difficult to determine. One means of assessment of medication efficacy in patients treated for end-stage disease symptoms or symptoms affecting quality of life is to withhold the medication if safe to do so for a short interval to assess utility and safety of that medication's use. Two examples where discovering ineffective medication is useful in older adults are overactive bladder medications and loop diuretics used for lower extremity edema in patients with venous stasis. Both medication classes present significant risk for the frail and older patients who use them.

Overactive bladder medications can cause cognitive impairment and cardiac events as well as occasionally inducing overflow incontinence by causing increased postvoid residual. Patients often fail treatment in part because other modes of treatment besides pharmacotherapy should be used simultaneously, such as routine toileting. The etiologies are so complex that medications alone are not always the solution.^{53,54} A study of 103,250 patients with mean age of 58.7 over 24 months taking medications for overactive bladder found that time to treatment failure was 159 days, with 91.7% failing to meet treatment goals.⁵⁵

Lower extremity edema is common because of inactivity and diminished homeostatic venous capacity, and, in some cases, the chronic use of loop diuretics achieves little improvement while placing patients at increased risk of electrolyte disorders, impaired renal function, and stimulation of the renin angiotensin system and volume depletion.⁵⁶ Often, lack of further evaluation to determine the correct etiology leads to inappropriate loop diuretic use long-term without efficacy.^{57,58} For those cases of loop diuretics resulting in little efficacy, management with increased movement and extremity elevation has been can be an effective alternative.

In general, aggressively applying a single pharmacologic mode can result in inefficacy in older patients because the problems older patients experience is so often multifactorial. One reason for treatment failure and inefficacy is that the multifactorial aspects to geriatric syndromes and problems are not evaluated. There are some medications that have not been shown widely effective, such as treatments for Alzheimer dementia, yet are difficult to stop because the decision about efficacy involves the beliefs of the caregivers and subjective findings.⁵⁹ Herbals, supplements, and vitamins are other examples of a category for which it is not easy to prove efficacy yet difficult to get patients to give up because of their belief and expectations. With herbals, supplements, and vitamins, the risk of unknown effects is problematic and it is worth attempting to gain patient trust to stop them if not needed. Explaining that herbals, supplements, and vitamins are not regulated as prescription and over-the-counter medications are by the FDA sometimes helps improve patient awareness.

Assess Alteration of Dosage Forms and the Impact of Food or Acid Suppression Therapy

Any patient, especially a person with swallowing difficulties, is liable to split tablets or open or crush capsules just to be able to take them. The challenge is that the practice of dosage form alteration can significantly alter the way the medications perform and lead to significant toxicity.⁶⁰ An Australian study showed that 17% of medications altered before administration had potential to cause increased toxicity, decreased efficacy, and safety or stability concerns, and the incidence of drug dosage form alteration was 46% in the high care setting, 34% in the intermediate care setting, and 2% in the low care setting.⁶¹ Therefore, an important component of polypharmacy management is at least occasionally (perhaps once annually) asking patients if they split or crush any tablets that they are taking. These data might help identify any treatment failures, toxicities, or adverse effects.

If medication treatment failures or abnormalities are observed, assessment of the potential impact of acid suppression therapy and bariatric surgery should be considered.^{62–64} Recently geriatrics practice are starting to see the first cohort of aging Roux-en-Y gastric bypass patients. They may present with nutrient deficiencies, which appear at first to be cognitive impairment of Alzheimer or other type of dementia, or sometimes with inability to get relief from pain medications as well as treatment failures. Also, it should be considered that when medications are developed, they are designed to perform under normal gastric circumstances in which the gastric pH is approximately 1.0, and chronic proton pump inhibitor use can elevate the gastric pH to over 4, which can alter the performance of some medications.^{62,65,66}

The effect of combining medications with food should be evaluated for evaluation of medication efficacy and possible link to side effects, such as upset stomach and nausea. With tamsulosin [Flomax], the recommendations are to take one-half hour after the same meal each day and to not crush or chew. The presence of food, however, causes a lower plasma peak and lower bioavailability than an empty stomach (30% increase in bioavailability and up to 70% higher plasma peak), meaning that instead

of increasing the dose of tamsulosin from 0.4 mg to 0.8 mg, a provider might try having the patient take it on an empty stomach in the morning, one-half hour before breakfast, to attempt to gain better efficacy, if the patient can tolerate the drug on an empty stomach.

Assess Patient Medication Use Experience and Patient-centered Medication Use Risks

There are multiple patient-centered factors that influence successful medication use and risk of medication use failures, for example, health literacy, cognitive impairment, recent transitions of care (hospitalization and rehabilitation stay), socioeconomic barriers to consistent medication access, and multiple providers. The following checklist represents patient-centered screens for medication or polypharmacy related patient-centered risks:

- Health literacy screening⁶⁷
- Morisky scale (adherence screen)⁶⁸
- Any recent hospitalization or transitions of care or institutionalization?
- Barrier to medication access
 - Transportation
 - Medicare D doughnut hole
 - Uncovered medications

Motivational interviewing to detect a patient's actual medication experience includes the use of open-ended questions. Ideally, going through the medication list one by one and asking what the medication is for, is it working, and if there are there any problems can be revealing. The ultimate driver of adherence is the belief that a medication works, which is strongly supported by feedback either by perceivable action or fostered by health care professional education and health literacy enforcement. Thus, medications, such as zolpidem (Ambien), which provide immediate feedback that they work, are adhered to closely. For statins, adherence is not driven as much by feedback. The discovery of subtle problems related to a patient's medication experience or common barriers, such as uncovered medications, might trigger a good time for a referral for CMM services (through Medicare D benefit or other, as discussed previously).

SUMMARY

The management of polypharmacy in a 15-minute office visit presents a significant challenge in older adults, yet the PCP and the patient-centered medical home seem to be the optimal places to implement overall medication management. Creating a systematic method to address polypharmacy in older patients, by looking to minimize the use of PIMs, performing CMR at least once annually (perhaps as part of the Medicare annual wellness visit), working with the office or extended community team (referral for CMM through Medicare D partners), and ensuring appropriate monitoring can go a long way toward improving outcomes and avoiding medication-related misadventure. Each practice has different polypharmacy management needs based on patient demographics, location, and health system parameters. Fortunately, there are growing varieties of resources online and in communities to make successful medication management a reality. Taking the time to curate a system and network for a practice will provide significant returns on investment via avoided hospitalization, increased billing levels, and heightened quality measure bonuses, but most of all, patients will feel empowered and more functional with improved medication management and avoidance of unnecessary polypharmacy.

REFERENCES

1. McCormick WC. Revised AGS Choosing Wisely((R)) list: changes to help guide older adult care conversations. *J Gerontol Nurs* 2015;41(5):49–50.
2. Cherry DLC, Decker SL. Population aging and the use of office-based physician services. NCHS data brief, no 41. Hyattsville (MD): National Center for Health Statistics; 2010. CDC websight.
3. Gurwitz J, Monane M, Monane S, et al. Brown University long-term care quality letter. American Society on Aging—National Council on Aging Annual Conference. 2001.
4. Van Spall HG, Toren A, Kiss A, et al. Eligibility criteria of randomized controlled trials published in high-impact general medical journals: a systematic sampling review. *JAMA* 2007;297(11):1233–40.
5. Tai-Seale M, McGuire T. Time is up: increasing shadow price of time in primary-care office visits. *Health Econ* 2012;21(4):457–76.
6. Sganga F, Landi F, Ruggiero C, et al. Polypharmacy and health outcomes among older adults discharged from hospital: results from the CRIME study. *Geriatr Gerontol Int* 2015;15(2):141–6.
7. Gamble JM, Hall JJ, Marrie TJ, et al. Medication transitions and polypharmacy in older adults following acute care. *Ther Clin Risk Manag* 2014;10:189–96.
8. Fried TR, O'Leary J, Towle V, et al. Health outcomes associated with polypharmacy in community-dwelling older adults: a systematic review. *J Am Geriatr Soc* 2014;62(12):2261–72.
9. Garfinkel D, Zur-Gil S, Ben-Israel J. The war against polypharmacy: a new cost-effective geriatric-palliative approach for improving drug therapy in disabled elderly people. *Isr Med Assoc J* 2007;9(6):430–4.
10. Hilmer SN, Mager DE, Simonsick EM, et al. A drug burden index to define the functional burden of medications in older people. *Arch Intern Med* 2007;167(8):781–7.
11. Hilmer SN, Gnjdjic D, Abernethy DR. Drug Burden Index for international assessment of the functional burden of medications in older people. *J Am Geriatr Soc* 2014;62(4):791–2.
12. Jodar-Sanchez F, Malet-Larrea A, Martin JJ, et al. Cost-utility analysis of a medication review with follow-up service for older adults with polypharmacy in community pharmacies in Spain: the conSIGUE program. *Pharmacoeconomics* 2015;33(6):599–610.
13. Wittayanukorn S, Westrick SC, Hansen RA, et al. Evaluation of medication therapy management services for patients with cardiovascular disease in a self-insured employer health plan. *J Manag Care Pharm* 2013;19(5):385–95.
14. Brummel A, Lustig A, Westrich K, et al. Best practices: improving patient outcomes and costs in an ACO through comprehensive medication therapy management. *J Manag Care Spec Pharm* 2014;20(12):1152–8.
15. Gazda NP, Berenbrok LA, Ferreri SP. Comparison of two Medication Therapy Management Practice Models on Return on Investment. *J Pharm Pract* 2016;30(3):282–5.
16. By the American Geriatrics Society Beers Criteria Update Expert Panel. American Geriatrics Society 2015 updated beers criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc* 2015;63(11):2227–46.
17. O'Mahony D, O'Sullivan D, Byrne S, et al. STOPP/START criteria for potentially inappropriate prescribing in older people: version 2. *Age Ageing* 2015;44(2):213–8.

18. Cipolle RJ, Cipolle RJ, Morley PC, et al. *Pharmaceutical care practice*. 3rd edition. New York: McGraw-Hill; 2012.
19. Woodall T, Landis SE, Galvin SL, et al. Provision of annual wellness visits with comprehensive medication management by a clinical pharmacist practitioner. *Am J Health Syst Pharm* 2017;74(4):218–23.
20. Collaborative PCPC. Integrating comprehensive medication management to optimize patient outcomes. 2nd edition. PCPCC Resource Guide on Integrating CMM. Washington, DC: Patient Centered Primary Care Collaborative; 2012. Available at: <https://www.pcpcc.org/sites/default/files/media/medmanagement.pdf>. Accessed February 1, 2017.
21. American College of Clinical Pharmacists. *Comprehensive medication management in team-based care*. Washington, DC: American College of Clinical Pharmacists Brief; 2016.
22. Gurwitz JH, Field TS, Harrold LR, et al. Incidence and preventability of adverse drug events among older persons in the ambulatory setting. *JAMA* 2003; 289(9):1107–16.
23. Budnitz DS, Lovegrove MC, Shehab N, et al. Emergency hospitalizations for adverse drug events in older Americans. *N Engl J Med* 2011;365(21):2002–12.
24. Budnitz DS, Shehab N, Kegler SR, et al. Medication use leading to emergency department visits for adverse drug events in older adults. *Ann Intern Med* 2007;147(11):755–65.
25. Thomsen LA, Winterstein AG, Sondergaard B, et al. Systematic review of the incidence and characteristics of preventable adverse drug events in ambulatory care. *Ann Pharmacother* 2007;41(9):1411–26.
26. Haynes RB, Ackloo E, Sahota N, et al. Interventions for enhancing medication adherence. *Cochrane Database Syst Rev* 2008;(2):CD000011.
27. Garfinkel D, Mangin D. Feasibility study of a systematic approach for discontinuation of multiple medications in older adults: addressing polypharmacy. *Arch Intern Med* 2010;170(18):1648–54.
28. Hilmer SN, Gnjjidic D, Le Couteur DG. Thinking through the medication list - appropriate prescribing and deprescribing in robust and frail older patients. *Aust Fam Physician* 2012;41(12):924–8.
29. UptoDate. Available at: http://www.uptodate.com/contents/drug-prescribing-for-older-adults?source=search_result&search=prescribing+Garfinkle&selectedTitle=1%7E150#H25. Accessed May 30, 2017.
30. Jordan S, Gabe M, Newson L, et al. Medication monitoring for people with dementia in care homes: the feasibility and clinical impact of nurse-led monitoring. *ScientificWorldJournal* 2014;2014:843621.
31. Cousins D. Current status of the monitoring of medication practice. *Am J Health Syst Pharm* 2009;66(5 Suppl 3):S49–56.
32. Steinman MA, Miao Y, Boscardin WJ, et al. Prescribing quality in older veterans: a multifocal approach. *J Gen Intern Med* 2014;29(10):1379–86.
33. Bell SP, Saraf AA. Epidemiology of multimorbidity in older adults with cardiovascular disease. *Clin Geriatr Med* 2016;32(2):215–26.
34. Downing NS, Shah ND, Neiman JH, et al. Participation of the elderly, women, and minorities in pivotal trials supporting 2011–2013 U.S. Food and Drug Administration approvals. *Trials* 2016;17(1):199.
35. Boyd CM, Vollenweider D, Puhan MA. Informing evidence-based decision-making for patients with comorbidity: availability of necessary information in clinical trials for chronic diseases. *PLoS One* 2012;7(8):e41601.

36. Boyd CM, Darer J, Boult C, et al. Clinical practice guidelines and quality of care for older patients with multiple comorbid diseases: implications for pay for performance. *JAMA* 2005;294(6):716–24.
37. Romera L, Orfila F, Segura JM, et al. Effectiveness of a primary care based multifactorial intervention to improve frailty parameters in the elderly: a randomised clinical trial: rationale and study design. *BMC Geriatr* 2014;14:125.
38. Yourman LC, Lee SJ, Schonberg MA, et al. Prognostic indices for older adults: a systematic review. *JAMA* 2012;307(2):182–92.
39. Min L, Yoon W, Mariano J, et al. The vulnerable elders-13 survey predicts 5-year functional decline and mortality outcomes in older ambulatory care patients. *J Am Geriatr Soc* 2009;57(11):2070–6.
40. Peron EP, Gray SL, Hanlon JT. Medication use and functional status decline in older adults: a narrative review. *Am J Geriatr Pharmacother* 2011;9(6):378–91.
41. Hilmer SN, Mager DE, Simonsick EM, et al. Drug burden index score and functional decline in older people. *Am J Med* 2009;122(12):1142–9.e1-2.
42. Hilmer SN, Gnjdjic D. The effects of polypharmacy in older adults. *Clin Pharmacol Ther* 2009;85(1):86–8.
43. Bennett A, Gnjdjic D, Gillett M, et al. Prevalence and impact of fall-risk-increasing drugs, polypharmacy, and drug-drug interactions in robust versus frail hospitalised falls patients: a prospective cohort study. *Drugs Aging* 2014;31(3):225–32.
44. Best O, Gnjdjic D, Hilmer SN, et al. Investigating polypharmacy and drug burden index in hospitalised older people. *Intern Med J* 2013;43(8):912–8.
45. Funnell M. What's new in the 2013 guidelines for diabetes care? *Nursing* 2013;43(7):66.
46. Nguyen V, deGoma EM, Hossain E, et al. Updated cholesterol guidelines and intensity of statin therapy. *J Clin Lipidol* 2015;9(3):357–9.
47. Armstrong C, Joint National Committee. JNC8 guidelines for the management of hypertension in adults. *Am Fam Physician* 2014;90(7):503–4.
48. Ickowicz E, American Geriatrics Society Expert Panel on the Care of Older Adults with Multimorbidity. Patient-centered care for older adults with multiple chronic conditions: a stepwise approach from the American Geriatrics Society. *J Am Geriatr Soc* 2012;60(10):1957–68.
49. Excellencje NBNIfHaC. Medicines Optimisation: the safe and effective use of medicines to enable the best possible outcomes. NICE guideline NG5. 2015. Available at: <https://www.nice.org.uk/guidance/service-delivery-organisation-and-staffing/medicines-management>. Accessed February 1, 2017.
50. Paige NM, Nagami GT. The top 10 things nephrologists wish every primary care physician knew. *Mayo Clin Proc* 2009;84(2):180–6.
51. Antimisiaris D, Miles T, Leey-Casella J, et al. New medical treatments: risks and benefits in practice. *Gerontologist* 2008;48:303.
52. Hanlon JT, Sloane RJ, Pieper CF, et al. Association of adverse drug reactions with drug-drug and drug-disease interactions in frail older outpatients. *Age Ageing* 2011;40(2):274–7.
53. Chapple C. Chapter 2: pathophysiology of neurogenic detrusor overactivity and the symptom complex of “Overactive Bladder”. *Neurourol Urodyn* 2014;33: S6–13.
54. Meng E, Lin WY, Lee WC, et al. Pathophysiology of overactive bladder. *Low Urin Tract Symptoms* 2012;4:48–55.
55. Chancellor MB, Migliaccio-Walle K, Bramley TJ, et al. Long-term patterns of use and treatment failure with anticholinergic agents for overactive bladder. *Clin Ther* 2013;35(11):1744–51.

56. Schartum-Hansen H, Loland KH, Svingen GF, et al. Use of loop diuretics is associated with increased mortality in patients with suspected coronary artery disease, but without systolic heart failure or renal impairment: an observational study using propensity score matching. *PLoS One* 2015;10(6):e0124611.
57. Thaler HW, Pienaar S, Wirnsberger G, et al. Bilateral leg edema in an older woman. *Z Gerontol Geriatr* 2015;48(1):49–51.
58. Ely JW, Osheroff JA, Chambliss ML, et al. Approach to leg edema of unclear etiology. *J Am Board Fam Med* 2006;19(2):148–60.
59. Casey DA, Antimisiaris D, O'Brien J. Drugs for Alzheimer's disease: are they effective? *P T* 2010;35(4):208–11.
60. Gopalraj RK, Antimisiaris DE, O'Brien JG, et al. Glossodynia: an unsuspected etiology. *J Am Geriatr Soc* 2009;57:S119.
61. Paradiso L. Crushing or altering medications: what's happening in residential aged-care facilities? *Australas J Ageing* 2002;21(3):123–7.
62. Ogawa R, Echizen H. Drug-drug interaction profiles of proton pump inhibitors. *Clin Pharmacokinet* 2010;49(8):509–33.
63. Miller AD, Smith KM. Medication use in bariatric surgery patients: what orthopedists need to know. *Orthopedics* 2006;29(2):121–3.
64. Miller AD, Smith KM. Medication and nutrient administration considerations after bariatric surgery. *Am J Health Syst Pharm* 2006;63(19):1852–7.
65. Shin JM, Sachs G. Pharmacology of proton pump inhibitors. *Curr Gastroenterol Rep* 2008;10(6):528–34.
66. Sachs G, Shin JM, Howden CW. Review article: the clinical pharmacology of proton pump inhibitors. *Aliment Pharmacol Ther* 2006;23(Suppl 2):2–8.
67. Louis AJ, Arora VM, Press VG. Evaluating the brief health literacy screen. *J Gen Intern Med* 2014;29(1):21.
68. Morisky DE, Ang A, Krousel-Wood M, et al. Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens (Greenwich)* 2008;10(5):348–54.